

REMARKS

In view of the following remarks, reconsideration of the present application is respectfully requested.

Rejections Under 35 U.S.C. § 112

The Examiner rejected claims 68 and 71 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Final Office Action, p. 2. The Examiner stated that he was “unable to locate [the] basis for exclusion of lithium halide.” *Id.* The Examiner asserted, incorrectly, that the present specification specifically calls for inclusion of lithium halide. *See id.* (citing Application, page 8, line 20). Applicants respectfully traverse this rejection.

The present specification states that the lithium halide or other molecular weight agents can be added to the reaction mixture before or during polymerization. *See* Application, page 8, line 17 – page 9, line 7. However, the specification does not necessitate the addition of lithium halide. *See id.* First, the specification provides for the addition of agents to control molecular weight but does not require the addition of such agents. *See id.* Second, if such agents are employed, compounds other than lithium halide can be utilized. *See, e.g.,* Application, page 10, lines 17-20 (discussing alkali metal carboxylate as the molecular weight modifying agent). Third, the disclosed examples do not incorporate lithium halide. *See* Application, page 12, line 15 – page 18, line 17. In sum, the exclusion of lithium halide, as claimed, is clearly supported by the discussion and examples disclosed in the present specification. *See* Application, page 8, line 17 – page 9, line 7; page 10, lines 17-20; page 12, line 15 – page 18, line 17. Accordingly, Applicants respectfully request that

Examiner withdraw the rejection under 35 U.S.C. § 112, first paragraph, and allow claims 68 and 71.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 42-50, 70, and 72 under 35 U.S.C. § 102 as being anticipated by Senga (5,093,469). The Examiner also rejected claims 42-50, 70, and 72 under 35 U.S.C. § 102 as being anticipated by Campbell (3,867,356). Of these rejected claims, claims 42 and 70 are independent. Applicants respectfully traverse these rejections.

Legal Precedent

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985); *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). To maintain a proper rejection under Section 102, a single reference must teach each and every element or step of the rejected claim. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569 (Fed. Cir. 1984). Moreover, the prior art reference also must show the *identical* invention “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added).

Features of Independent Claims 42 and 70 Missing from Senga

Independent claim 42 recites a method of polymerizing polyphenylene sulfide, comprising “reacting an aqueous metal hydroxide with a polar organic compound within a temperature range of 50° to 200° C to form a solution comprising an alkali metal aminoalkanoate

without isolating a solid from the solution; [and] contacting a sulfur source with the solution to form a mixture.” Independent claim 70 recites “reacting an aqueous metal hydroxide with a polar organic compound outside of the presence of a sulfur source within a first temperature range of about 50° to about 200° C to form a solution comprising an alkali metal aminoalkanoate and the polar organic compound; [and] contacting a sulfur source with the solution to form a mixture.”

In contrast, the Senga reference discloses a separate non-polymerization process for manufacturing a purified, solid alkali metal aminoalkanoate. *See* Senga, col. 6, lines 7-18. The Senga reference does not contemplate or disclose the act of reacting components in a polyphenylene sulfide (PPS) polymerization process to form an alkali metal aminoalkanoate as an intermediate and adding a sulfur source to the intermediate solution. Instead, Senga discloses the discrete preparation of solid alkali metal aminoalkanoate to be utilized in a separate polymerization process. *See id.* The alkali metal aminoalkanoate and other feedstocks may be fed to the PPS polymerization in any order. *See* Senga, col. 6, lines 18-24.

In the Final Office Action, the Examiner stated that it “is apparent that isolating the dry metal aminoalkanoate was carried out [in Senga] merely to perform tests to confirm the identity of the compound” and that such an isolation would not be performed commercially. *See* Final Office Action, page 3. The Examiner contended “[t]his is especially true in view of the fact that fresh N-methylene pyrrolidone is added along with the sodium hydrosulfide (col. 8, line 13) during preparation of the polyphenylenesulfide.” *See id.* The Examiner asked “[w]hy would one of

ordinary skill bother to isolate the sodium methylaminobutyrate from N-methylpyrrolidone if additional N-methylpyrrolidone is to be later added along with the sulfur source?” *See id.*, at 6.

However, this is exactly what is done in Senga. *See* col. 2, line 34 – col. 3, line 12. “The alkali metal aminoalkanoate may be used in the form of an anhydride, a hydrate or an aqueous solution, like the sodium sulfide.” *Id.* Senga does not teach forming the alkali metal aminoalkanoate as an intermediate within a polymerization process, either in the laboratory or on a commercial scale. *See* Senga, col. 6, lines 7-18. Instead, the alkali metal aminoalkanoate in Senga is produced and then utilized as a feedstock in a subsequent polymerization process. *See id.* Applicants stress that employment of the solvent N-methylpyrrolidone (NMP) in both the process of producing alkali metal aminoalkanoate and in the separate process of producing polyphenylenesulfide (PPS) does not imply that the two processes are combined, as asserted by the Examiner. *See* Final Office Action, pages 3 and 6. *See* col. 2, line 34 – col. 3, line 12. Senga treats the alkali metal aminoalkanoate, sodium sulfide, and lithium halide equally as feedstocks that may added in various forms and in any order to a commercial polymerization process. *See* col. 2, line 34 – col. 3, line 12; col. 6, lines 18-24. The Senga feedstocks (i.e., alkali metal aminoalkanoate, sodium sulfide, and lithium halide) are not produced in the PPS polymerization.

It should be noted that Senga allows for a one-stage reaction in the commercial PPS polymerization, precluding the production of a metal aminoalkanoate. *See* col. 6, line 51-52. Moreover, Senga does *not* impose an intermediate ceiling temperature within the PPS polymerization that addresses the corrosive effects of the reactant sodium hydroxide used to

produce the alkali metal aminoalkanoate. *See* col. 6, lines 32-39. Instead, the cited reference discloses higher temperature limits directed to preventing degradation of the polymer with no mention of the corrosive effects of sodium hydroxide and the resulting metal contamination of the PPS. *See id.* Indeed, Senga does not consider issues of metallurgy, corrosion, and metal contamination (of the PPS) associated with production of metal aminoalkanoate in a PPS polymerization. Again, Senga discloses that the alkali metal aminoalkanoate is produced and isolated for subsequent addition to the Senga polymerization process. *See* Senga, col. 6, lines 7-18.

Accordingly, Applicants respectfully assert that it is clear that independent claims 42 and 70 or the claims dependent thereon, are not anticipated by Senga. Therefore, Applicants respectfully request the Examiner withdraw the rejection of claims 42-50, 70, and 72 under 35 U.S.C. § 102 based on Senga and allow the claims.

Features of Independent Claims 42 and 70 Missing from Campbell

As with the Senga reference, the Campbell reference does not disclose the features of claims 42 and 70 recited above. While the passage cited by the Examiner mentions a solution, it is clear that the Campbell reference, like the Senga reference, contemplates and teaches a separate process by which an alkali metal aminoalkanoate is prepared. *See* Final Office Action, page 3 (citing Campbell, col. 5, line 7-31); *see also* Campbell, col. 5, lines 53-59 and col. 6, lines 14-20. Campbell does not produce the alkali metal aminoalkanoate as an intermediate in a polymerization process. *See id.* Instead, the various feedstocks including the alkali metal aminoalkanoate may be added in any order to the subsequent polymerization. *See* Campbell, col. 2, lines 21-40. The alkali

metal aminoalkanoate is clearly a feedstock not generated in the Campbell PPS polymerization process. *See* col. 1, lines 39-55; col. 2, lines 45-49. Accordingly, Applicants respectfully assert that independent claims 42 and 70 or the claims dependent thereon, are not anticipated by the Campbell reference. Therefore, Applicants respectfully request the Examiner withdraw the rejection of claims 42-50, 70, and 72 under 35 U.S.C. § 102 based on Campbell and allow the claims.

Alternate Rejections Under 35 U.S.C. § 103

The Examiner alternatively rejected claims 42-50, 70, and 72 under 35 U.S.C. § 103 as being unpatentable over Senga. Likewise, the Examiner also alternatively rejected claims 42-50, 70, and 72 under 35 U.S.C. § 103 as being unpatentable over Campbell. Applicants respectfully traverse these rejections.

Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). To establish a *prima facie* case, the Examiner must show that the modified reference or combination of references includes *all* of the claimed elements, and provide a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *See Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the modification or combination. *See ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior

art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

Deficiencies of the Rejections

As discussed above, the Senga and Campbell references do not disclose features recited in independent claims 42 and 70. Further, the Examiner has failed to provide a modification of the references that would support an obvious rejection. Accordingly, Applicants respectfully request that the Examiner withdraw the rejections of claims 42-50, 70, and 72 under 35 U.S.C. § 103 as being unpatentable over Senga and as being unpatentable over Campbell.

Remaining Rejections Under 35 U.S.C. § 103

Further, the Examiner rejected claims 1, 35-50, and 60-67, 69, 70, and 72 under 35 U.S.C. § 103 over Senga in view of Koyama ('433). Lastly, the Examiner rejected claims 1, 35-50, and 60-67, 69, 70, and 72 under 35 U.S.C. § 103 over Campbell in view of Koyama. Claims 1, 42, 60, 61, and 70 are independent. Applicants respectfully traverse these rejections.

Features of Independent Claims 42 and 70 Missing from the Cited Combinations

With regard to independent claims 42 and 70, Koyoma does not obviate the deficiencies of the Senga and Campbell references discussed above. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness with respect to claims 42 and 70, or their dependent claims.

Features of Independent Claims 1, 60, and 61 Missing from the Cited Combinations

Independent claim 1 recites:

reacting an aqueous *metal hydroxide* with a polar organic compound within a *metal vessel comprising iron, chromium and nickel* and . . . contacting a sulfur source with the solution to form a mixture; [and]

contacting at least a dihaloaromatic compound, with the mixture under polymerization conditions to form polyphenylene sulfide polymers, wherein the corrosiveness of at least one of the solution or the mixture to the metal vessel is such that the *polyphenylene sulfide polymers comprise less than 55 ppm iron, less than 15 ppm chromium, or less than 15 ppm nickel*, or any combination thereof.

Independent claim 60 recites:

providing a *reactor vessel comprising a metal surface comprising one or more of iron, chromium and nickel* suitable for contacting at least a dehydrated solution of an aqueous *metal hydroxide* and a polar organic compound, a dehydrated mixture of the dehydrated solution and a sulfur source, and polymerization reactants comprising at least one dihaloaromatic compound; and

forming polyphenylene sulfide polymers in the reactor vessel, wherein *polyphenylene sulfide polymers prepared in the metal reactor vessel contain less than 55 ppm iron, less than 15 ppm chromium, or less than 15 ppm nickel*.

Independent claim 61 recites:

placing an aqueous *metal hydroxide* and a polar organic compound within a *metal vessel comprising iron, chromium, and nickel*;

heating the aqueous metal hydroxide and the polar organic compound in the vessel to a reaction temperature of less than 200° C for a time interval sufficient to substantially react the metal hydroxide with the polar organic compound to form a solution comprising the polar organic compound, water, and an alkali metal aminoalkanoate;

adding a sulfur source to the vessel to form a mixture of the sulfur source and the solution; [and]

contacting at least a dihaloaromatic compound with the mixture in the vessel under polymerization conditions to form

polyphenylene sulfide polymers comprising less than 40 ppm iron, less than 7 ppm chromium, or less than 9 ppm nickel, or any combination thereof.

As indicated above, the Senga and Campbell references do not teach or suggest reacting a metal hydroxide and a polar organic compound in the PPS polymerization reactor, as claimed. In addition, the Koyoma reference does nothing to obviate these deficiencies of Senga and Campbell. Further, the three cited references, taken alone or in combination, do not teach or suggest PPS polymers having the claimed metal concentrations. Indeed, the references are absolutely devoid of any indication of corrosion and the associated metal contamination of PPS polymers. Lastly, for at least the reason that Senga and Campbell do not teach or suggest process features as recited in the claims, Applicants traverse the Examiner's assertion that the claimed metal concentrations of the PPS are inherent in Senga and Campbell. *See* Final Office Action, pages 4-5. In view of these deficiencies, the Examiner has failed to establish a *prima facie* case of obviousness with respect to independent claims 1, 60 and 61, and their dependent claims.

Request Withdrawal of Rejections

Accordingly, Applicants respectfully request that the Examiner withdraw the rejections of claims 1, 35-50, and 60-67, 69, 70, and 72 under 35 U.S.C. § 103 and allow the claims.

Conclusion

If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

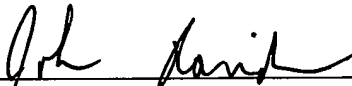
General Authorization for Fees and Extensions of Time

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat any future reply requiring an extension of time as incorporating a request therefor.

Furthermore, Applicants authorizes the Commissioner to charge any fees required to advance prosecution to Deposit Account No. 06-1315; Order No. CPCM:0002-1/FLE (33776US02).

Respectfully submitted,

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